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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/552,985	07/10/2007	Yasufumi Asao	00684.109140.	2399

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FITZPATRICK CELLA HARPER & SCINTO
1290 Avenue of the Americas
NEW YORK, NY 10104-3800

EXAMINER	
BRAY, STEPHEN A	
ART UNIT	PAPER NUMBER
2629	
MAIL DATE	DELIVERY MODE
09/14/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/552,985	ASAO ET AL.	
	Examiner	Art Unit	
	STEPHEN BRAY	2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *7 and 10-17* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *10-16* is/are rejected.

8)☒ Claim(s) *17* is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/06/2011 has been entered.

Response to Arguments

2. Applicant's arguments filed 6/06/2011 have been fully considered but they are not persuasive.

Regarding the Applicant's arguments on Pages 7-10 under the heading "*Claim Rejections*", the Examiner disagrees that Ben-David et al (US 7,268,757) in view of Yoshida et al (US 5,796,378) fails to teach the subject matter of Claim 7. *Ben-David et al* teaches an LC color display which contains a plurality of unit pixels, where each unit pixel is composed of a plurality of subpixels, each unit pixel consisting of a red subpixel, a green subpixel, a blue subpixel, a yellow subpixel, a magenta subpixel, and a cyan subpixel as shown in Figure 12A. Figure 2B of *Ben-David et al* teaches that each subpixel has an LC layer which changes in transmittance based upon an applied voltage, thereby changing the brightness of the subpixel. *Ben-David et al* fails to teach a subpixel having an LC medium which acts to change both the brightness and hue of light passing through the LC medium. *Yoshida et al* teaches an LC display composed

of a plurality of pixels, wherein each pixel is composed of a plurality of subpixels. Column 1, lines 51 through Column 2, line 67 of *Yoshida et al* discloses that the pixels of the LC display device contain an LC medium which acts to change the brightness and color (hue) of light passing through in accordance with an applied voltage. Column 17 and TABLE 2 of *Yoshida et al* discloses that each of the three subpixels output light having a different color, which combine to give the pixel its desired color. For example, for one of the pixels of the LC display, when a first subpixel outputs a white color, a second pixel outputs a green color, and a third subpixel outputs a green color, the pixel then shows the display color green 1. Figure 1 and Column 6, lines 1-26 of *Yoshida et al* also discloses that the color produced by each subpixel is dependent upon the applied voltage without using gradation colors (i.e. only white, green, red, and blue colors are used). Therefore *Ben-David et al* in view of *Yoshida et al* teaches the subject matter of Claim 7.

Claim Rejections - 35 USC § 103

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ben-David et al (US 7,268,757) in view of Yoshida et al (US 5,796,378).

Regarding claim 7, *Ben-David et al* discloses a color display apparatus of the type wherein a unit pixel is constituted by a plurality of subpixels including three first subpixels and three second subpixels, each of the first subpixels having a color filter of a color selected from three colors of yellow, magenta, and cyan, and each of the second subpixels having a color filter of a second color selected from three colors of red, green, and blue, so as to generate a display state of the pixel by an additive color mixture of the first subpixels and the second subpixels (Figures 12A - 12B of *Ben-David et al* disclose having a plurality of subpixels consisting of three first subpixels which consist of the colors red, green and blue, and a plurality of second subpixels which consist of the colors cyan magenta, and yellow. Figure 2B of *Ben-David et al* discloses having a filter array 216 for coloring the pixels. Column 19, lines 15-38 of *Ben-David et al* also discloses having a mode of operation in which the display state of the pixel is determined based upon the additive color mixture of the first subpixels and the second subpixels.), and

a medium for changing an optical property depending on a voltage applied thereto (Column 10, line 64 through Column 11, line 31 of *Ben-David et al* discloses having a liquid crystal material which has its transmittance (brightness) changed based upon an applied voltage.), said color display apparatus comprising:

means for applying a voltage, to the three second subpixels, for changing the optical property of the medium within a brightness change range in which the light passing through the medium is changed in brightness (Figures 12A – 12B and Column 2, line 64 through Column 3, line 54 of *Ben-David et al* disclose applying a voltage to each sub-pixel of the display device, where the transmittance (i.e. brightness) of the sub-pixel changes based upon the voltage applied to the liquid crystal material of the subpixel.),

and the optical property of the medium in the second subpixels is changed continuously (Figures 12A – 12B and Column 2, line 64 through Column 3, line 54 of *Ben-David et al* disclose applying a voltage to each sub-pixel of the display device, where the transmittance (i.e. brightness) of the sub-pixel changes based upon the voltage applied to the liquid crystal material of the subpixel.).

Ben-David et al fails to teach a medium for changing an optical property depending on a voltage applied thereto is disposed, said color display apparatus comprising:

means for applying a voltage to each of the three first subpixels, for changing the optical property of the medium within a brightness change range in which light passing

through the medium is changed in brightness and a hue change range in which the light passing through the medium assumes chromatic color and a hue of the chromatic color is changed; and

wherein the optical property of the medium in the first subpixels is changed without using gradation colors and the optical property of the medium in the second subpixels is changed continuously.

Yoshida et al discloses a medium for changing an optical property depending on a voltage applied thereto is disposed (Figure 3 of *Yoshida et al* discloses having a liquid crystal material 56 which changes its optical property based upon an applied voltage.), said color display apparatus comprising:

means for applying a voltage, to the three first subpixels, for changing the optical property of the medium within a brightness change range in which light passing through the medium is changed in brightness and a hue change range in which the light passing through the medium assumes chromatic color and a hue of the chromatic color is changed (Figure 3 and Column 5, line 1 through Column 6, line 15 of *Yoshida et al* discloses applying a voltage to a plurality of subpixels to change the optical property of a medium to generate a change in color of light passing through said plurality of subpixels. Column 11, lines 1-9 of *Yoshida et al* discloses changing the brightness of light passing through the subpixels, i.e. "light white", instead of a brighter white light. Column 1, lines 41-55 of *Yoshida et al* disclose that said LC display apparatus can generate display colors, i.e. hue and gradation (brightness), which are close to the real colors.); and

wherein the optical property of the medium in the first subpixels is changed without using gradation colors (TABLE 2, which is located in Column 17 of *Yoshida et al,* discloses that the display color seen at the unit pixel is created by having each subpixel emit light of a specified color. Figure 1 and Column 6, lines 1-26 of *Yoshida et al* also disclose that the color produced by each subpixel is dependent upon the applied voltage. Therefore the optical property of the medium is changed without using gradation colors (i.e. only white, green, red, and blue are used in each subpixel.).).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the display device taught by *Ben-David et al* with the teachings of *Yoshida et al* in order to form a display device which can display colors which are very close to the real colors to be displayed.

Regarding claim 10, *Ben-David et al* as modified above discloses an apparatus according to claim 7, wherein said apparatus further comprises a pair of oppositely disposed substrates, and a layer of liquid crystal as the medium (Figure 3 of *Yoshida et al* discloses having a pair of oppositely disposed substrates 41, 51, where a layer of liquid crystal material 56 is disposed between the oppositely disposed substrates 41, 51.), and

wherein said apparatus has a function of modulating incident polarized light into a predetermined state of polarization by utilizing a change in retardation on the basis of a change in alignment of liquid crystal molecules in the liquid crystal layer (Column 4, line 45 through Column 6, line 15 of *Yoshida et al* discloses that incident light is

polarized into a predetermined state based upon the alignment of the liquid crystal molecules 56.), and

the three first subpixels execute color display using a modulation area on the basis of change in hue depending on the change on the basis of the change in alignment of liquid crystal molecules in the liquid crystal layer (Column 4, line 45 through Column 6, line 15 of *Yoshida et al* discloses that the color of the subpixels is changed in accordance with the voltage applied to the liquid crystal 56, where the alignment of the liquid crystal 56 is dependent upon the applied voltage.).

6. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ben-David et al (US 7,268,757) and Yoshida et al (US 5,796,378) as applied to claim 10 above, and further in view of Clerc et al (US 4,813,770).

Regarding claim 11, *Ben-David et al* as modified above discloses an apparatus according to claim 10.

Ben-David et al as modified above fails to teach wherein the liquid crystal molecules in the liquid crystal layer have a negative dielectric anisotropy and are substantially aligned homeotropically with respect to the substrate when a voltage is not applied to the liquid crystal layer.

Clerc et al discloses wherein the liquid crystal molecules in the liquid crystal layer have a negative dielectric anisotropy and are substantially aligned homeotropically with respect to the substrate when a voltage is not applied to the liquid crystal layer (Figure 3 and Column 7, lines 11-17 of *Clerc et al* discloses that the liquid crystal modules of

layers 2 and 4 are aligned substantially perpendicular to the substrate when a voltage is not applied to the substrate. The abstract of *Clerc et al* also discloses that the liquid crystal molecules consist of a negative anisotropy material.).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to further modify the display device taught by *Ben-David et al* with the teachings of *Clerc et al* in order to form a display device in which parasitic visual effects and slowness of the optical response can be avoided.

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ben-David et al (US 7,268,757) and Yoshida et al (US 5,796,378) and Clerc et al (US 4,813,770) as applied to claim 11 above, and further in view of Ono et al (US 6,038,001).

Regarding claim 12, *Ben-David et al* as modified above discloses an apparatus according to claim 11.

Ben-David et al as modified above fails to teach wherein the liquid crystal molecules are controlled so that they are inclined in at least two directions different in optical axis thereof when a voltage is applied to the liquid crystal layer.

Ono et al discloses wherein the liquid crystal molecules are controlled so that they are inclined in at least two directions different in optical axis thereof when a voltage is applied to the liquid crystal layer (Figure 3 of *Ono et al* discloses that the liquid crystal modules 18a are inclined in at least two directions different in optical axis when a voltage is applied to the liquid crystal layer 18.).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to further modify the display device taught by *Ben-David et al* with the teachings of *Ono et al* in order to form a display device which can display clear gray-scale images while being driven in high-duty time division, which exhibits a narrow operating voltage margin.

8. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ben-David et al (US 7,268,757) and Yoshida et al (US 5,796,378) as applied to claim 10 above, and further in view of Ono et al (US 6,038,001).

Regarding claim 13, *Ben-David et al* as modified above discloses an apparatus according to claim 10.

Ben-David et al as modified above fails to teach wherein the liquid crystal molecules in the liquid crystal layer are placed in a bend alignment state at least when a voltage is applied to the liquid crystal layer.

Ono et al discloses wherein the liquid crystal molecules in the liquid crystal layer are placed in a bend alignment state at least when a voltage is applied to the liquid crystal layer (Figure 3 of *Ono et al* discloses aligning the liquid crystal modules into a bend alignment state when a voltage is applied.).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to further modify the display device taught by *Ben-David et al* with the teachings of *Ono et al* in order to form a display device which can display

clear gray-scale images while being driven in high-duty time division, which exhibits a narrow operating voltage margin.

9. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ben-David et al (US 7,268,757) and Yoshida et al (US 5,796,378) as applied to claim 10 above, and further in view of Iwauchi et al (US 5,841,492).

Regarding claim 14, *Ben-David et al* as modified above discloses an apparatus according to claim 10.

Ben-David et al as modified above fails to teach wherein the liquid crystal molecules in the liquid crystal layer are substantially aligned homogeneously with respect to the substrate when a voltage is not applied to the liquid crystal layer.

Iwauchi et al discloses wherein the liquid crystal molecules in the liquid crystal layer are substantially aligned homogeneously with respect to the substrate when a voltage is not applied to the liquid crystal layer (Column 6, lines 55-67 of *Iwauchi et al* discloses that when no voltage is applied to the liquid crystal layer 4-5, the layer aligns homogeneously (i.e. parallel) with respect to the substrate 1.).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to further modify the display device taught by *Ben-David et al* with the teachings of *Iwauchi et al* in order to form a display device which can realize a bright multi-color display.

10. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ben-David et al (US 7,268,757) and Yoshida et al (US 5,796,378) as applied to claim 10 above, and further in view of Hall (US 5,841,494).

Regarding claim 15, *Ben-David et al* as modified above discloses an apparatus according to claim 10.

Ben-David et al as modified above fails to teach wherein said apparatus is a transflective-type color display apparatus in which a single polarizing plate is used.

Hall discloses wherein said apparatus is a transflective-type color display apparatus in which a single polarizing plate is used (Figure 4 and the abstract of *Hall* discloses a transflective display with a single polarizing plate 12 being used.).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to further modify the display device taught by *Ben-David et al* with the teachings of *Hall* in order to form a display device in which the brightness of the display can be greater than the brightness of "transmissive only" LCD display devices.

11. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ben-David et al (US 7,268,757) and Yoshida et al (US 5,796,378) as applied to claim 7 above, and further in view of Moon (US 6,621,543).

Regarding claim 16, *Ben-David et al* as modified above discloses an apparatus according to claim 7.

Ben-David et al as modified above fails to teach wherein said apparatus is a transflective-type color display apparatus comprising at least light illumination means, a

pair of substrates each provided with an electrode, and a pair of polarization plates, and wherein at least one of the pair of substrates has a light reflective first area and a light transmissive second area.

Moon discloses wherein said apparatus is a transflective-type color display apparatus comprising at least light illumination means, a pair of substrates each provided with an electrode, and a pair of polarization plates, and wherein at least one of the pair of substrates has a light reflective first area and a light transmissive second area (Figure 5 and Column 5, line 22 through Column 6, line 23 of *Moon* disclose having a transflective LCD device 100 with a backlight 115, a first substrates 101 with an electrode 108, a second substrate 105 which has a reflective electrode 109, which makes up a light reflective first area, and containing transparent portions “H” which make up a light transmissive second area, and a pair of polarization plates 103 and 111.).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to further modify the display device taught by *Ben-David et al* with the teachings of *Moon* in order to form a display device in which absorption of light by the lower polarizer can be reduced or prevented.

Allowable Subject Matter

12. Claim 17 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter: The Examiner has not found a reference which teaches that the first subpixel having the yellow color filter displays black, yellow, red, and green, the first subpixel having the magenta color filter displays black, magenta, red, and blue, and the first subpixel having the cyan color filter displays black, cyan, green, and blue.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEPHEN BRAY whose telephone number is (571)270-7124. The examiner can normally be reached on Monday - Friday, 9:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, AMR AWAD can be reached on (571)272-7764. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/STEPHEN A BRAY/
Examiner, Art Unit 2629

/Amr Awad/
Supervisory Patent Examiner, Art Unit 2629

10 September 2011